

Electrocardiogram Experiment

using latin square design

Young Geun Kim
ygeunkim.github.io

2019711358, Department of Statistics

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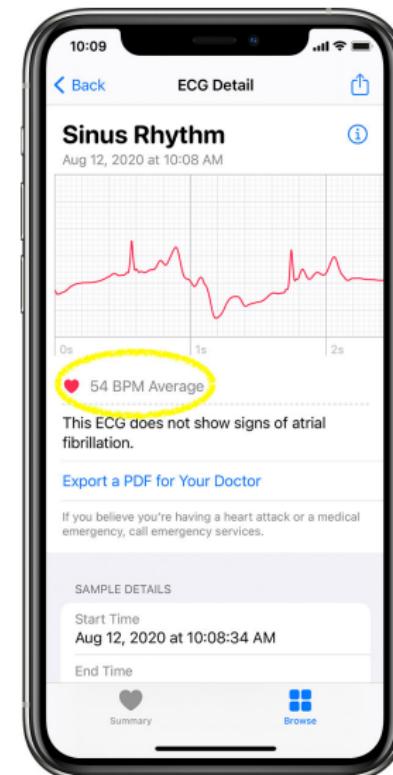
Section 1

Introduction

Electrocardiogram Experiment

Goal

- Does caffeine affect ECG or *heart rate*?
- Caffeine: *coffee*
- Output: Average heart rate (BPM)



Latin Square Design

Table 1: Latin Square Design

Row	Column			
	1	2	3	4
1	A	B	C	D
2	B	C	D	A
3	C	D	A	B
4	D	A	B	A

- Each treatment once in each row and column
- We allocate 4 treatment levels randomly later

Section 2

Design and the Data

Block Factors

Row: Coffee-to-water ratio

- ① 1:0 (espresso, 40ml)
- ② 1:2
- ③ 1:8
- ④ 1:15

Column: Drinking speed

- ① ≤ 5 sec
- ② 5-20 sec
- ③ 20-50 sec
- ④ $50 <$ sec



Factor

Intake of caffeine (himynameisabcde, 2020) from Starbucks by Nespresso

- ① House blend: 74.5 mg
- ② Sumatra: 54.5 mg
- ③ Decaf espresso roast: 3 mg
- ④ Just water: 0 mg

Randomization

- ① Randomly allocate (1, 2, 3, 4) to previous (A, B, C, D)
- ② Assign to above Table 1
- ③ Equivalent to random allocation

```
set.seed(1)
sample(LETTERS[1:4])
#> [1] "A" "C" "D" "B"
```

- Ⓐ House blend (74.5 mg)
- Ⓑ Water (0 mg)
- Ⓒ Sumatra (54.5 mg)
- Ⓓ Decaf espresso roast (3 mg)

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References

Latin Square

Output

Value: Average heart rage

- in BPM
- Let Y_{ijk}

Measure

- Apple Watch Series 4
- watchOS 7.3.3 (1.18S830)
- ECG app
- Algorithm version: 1

Controlling the Other Variables

Coffee

- Drink coffee every morning
- before eating breakfast
- Nespresso machine: Pixie C61 in my home

Measure

- Sitting at the table
- Rest my arms on the table
- Use the same strip
 - Nike sport band
 - of same fit (8-th)
- and other instructions in
<https://support.apple.com/en-us/HT208955>

Section 3

Analysis

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References

ANOVA

Section 4

Related Contents

Project Repo

My Github project for this experiment:

<https://github.com/ygeunkim/ecg-experiment>

himynameisabcde (2020). r/nespresso - i received the caffeine content numbers for starbucks nespresso pods!

Lee, K. (2021). Design and analysis of experiments (sta5031).
<https://icampus.skku.edu>. Accessed: 2021-03-20.